



10/04/99

Case Docket No. PHA 23,789

A

THE COMMISSIONER OF PATENTS AND TRADEMARKS, Washington, D.C. 20231

Enclosed for filing is the patent application of Inventor(s):

RAYMOND J. KRASINSKI

For: METHOD AND APPARATUS FOR STREAMING XML CONTENT

jc135 U.S. PTO
09/411756
10/04/99**ENCLOSED ARE:**

- ☒ Associate Power of Attorney;
- ☒ Information Disclosure Statement, Form PTO-1449 and copies of documents listed therein;
- ☐ Preliminary Amendment;
- ☒ Specification (20 Pages of Specification, Claims, & Abstract);
- ☒ Declaration and Power of Attorney:
(2 Pages of a ☒ fully executed ☐ unsigned Declaration);
- ☒ Drawing (5 sheets of ☒ informal ☐ formal sheets);
- ☐ Certified copy of application Serial No. ;
- ☒ Other: Authorization Pursuant to 37 CFR 1.136
- ☒ Assignment to Philips Electronics North America Corporation

FEE COMPUTATION

CLAIMS AS FILED				
FOR	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE - 760.00
Total Claims	26 - 20 =	6	X \$18 =	108.00
Independent Claims	10 - 3 =	7	X \$78 =	546.00
Multiple Dependent Claims, if any			\$260 =	0.00
TOTAL FILING FEE				\$1,414.00

Please charge Deposit Account No. 14-1270 in the amount of the total filing fee indicated above, plus any deficiencies. The Commissioner is also hereby authorized to charge any other fees which may be required, except the issue fee, or credit any overpayment to Account No. 14-1270.

☐ Amend the specification by inserting before the first line the sentence: --This is a continuation-in-part of application Serial No. , filed .--.

CERTIFICATE OF EXPRESS MAILINGExpress Mail Mailing Label No. EL45821771345

Date of Deposit OCTOBER 4, 1999
 I hereby certify that this paper and/or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Noemi Chapa
 Printed Name

Noemi Chapa
 Signature

Gregory L. Thorne
 Gregory L. Thorne, Reg. No. 39,398
 Attorney
 (914) 333-9665
 U.S. Philips Corporation
 580 White Plains Road
 Tarrytown, New York 10591
 S:\th\MM29THGO.NCO.doc

654007.527600

METHOD AND APPARATUS FOR STREAMING XML CONTENT

Field of the Invention

The present invention relates to the streaming of continuous media, and more particularly, to a method and apparatus for streaming XML content.

Background of the Invention

The Extensible Markup Language (XML) is a standard for encoding textual information that has been recommended by the World Wide Web Consortium (W3C). For a discussion of the XML standard, see, for example, Extensible Markup Language (XML) 1.0 W3C Recommendation, <http://www.w3.org/TR/1998/REC-xml-19980210>, incorporated by reference herein. The XML standard allows XML-enabled applications to inter-operate with other compliant systems for the exchange of encoded information.

XML documents store textual data in a hierarchical tree structure. Each XML document has one root node, often referred to as the root element, with the other nodes in the hierarchical tree being arranged as descendants of the root node. The XML standard specifies four types of nodes, namely, character nodes, processing instruction (PI) nodes, comment nodes and element nodes. A character node contains only one character. A processing instruction node contains a name field and a content field (a sequence of characters). A comment node has only a

content filed (a sequence of characters). Character nodes, processing instruction (PI) nodes and comment nodes are always leaf nodes in an XML document. Element nodes have children, a name (often referred to as a generic identifier (GI)), and a set of attributes (keyword-value pairs). An XML-based application can store data in all the different types of nodes and in all the fields of each node type.

A number of applications, such as video on demand and other continuous media applications, have emerged for encoding and transmitting continuous media streams. The proposed MPEG-7 standard, for example, from the Motion Pictures Group, provides a specification for encoding video information as well as textual information related to the video source. Continuous media streams are typically transmitted using a packet-based communication system. Due to the unreliable nature of packet-based communication systems, however, the quality of the received stream may be impacted by packet loss. Thus, such continuous media transmission systems generally must include a mechanism that allows the receiver to adapt to lost packets. A number of techniques have been proposed or suggested for addressing packet loss in a continuous media transmission system, including redundant transmissions, retransmission, interleaving and forward error correction techniques. For a general discussion of such techniques for addressing packet loss in continuous media systems, see, for example, "Options for Repair of Streaming

Media," Network Working Group, Request for Comments No. 2354 (June, 1998), downloadable from ftp.isi.edu/in-notes/rfc2354.txt, incorporated by reference herein.

XMLNet is an application programming interface (API) for streaming XML documents. XMLNet allows information to be transferred over the Internet or another network in real time as a series of XML documents. The XML documents are delivered to the receiver in a serial fashion. The receiver must receive an entire XML document, however, before the receiver can decode and process any of the XML content contained in the XML document. For a discussion of XMLNet, see, for example, "XMLNet," downloadable from home.earthlink.net/%7Earabbit/xmlnet (December 9, 1998).

A need therefore exists for a method and apparatus that allows a receiver to decode the portions of the XML encoded content that are actually received, even if portions of the complete XML document are not received, for example, in the event of a packet loss or before the complete XML document is received. A further need exists for a method and apparatus that permits streaming of XML content in a manner that allows the transmitted XML to be decoded by the receiver even if an entire XML document is not received.

Summary of the Invention

Generally, a method and apparatus are disclosed for streaming XML content in a manner that allows the receiver to decode the XML data that is received even if an entire XML document is not received. An XML receiver may decode only a portion of the streamed XML content, for example, if part of the XML data is subject to a packet loss or if the complete XML document has not yet arrived. Thus, the present invention allows the XML receiver to begin processing an XML stream in mid-transmission.

According to one aspect of the invention, each XML document is decomposed and encoded as a collection of sub-trees. Each sub-tree from the larger XML document tree can be parsed and validated by the XML receiver as if it is an independent tree. According to another aspect of the invention, each sub-tree in the streamed XML document utilizes a structure node that serves as a sub-tree wrapper function around each independent sub-tree. The structure node indicates the relationship of the sub-tree to other sub-trees, thereby allowing the XML receiver to reconstruct the full tree, provided enough of the streamed XML content is received. As used herein, a "structure node" is any node that identifies the content nodes included in a given sub-tree and indicates where the sub-tree is positioned within the larger XML document tree.

A more complete understanding of the present invention, as well as further features and advantages of the present invention, will be obtained by reference to the following detailed description and drawings.

5

Brief Description of the Drawings

FIG. 1 illustrates a representative network environment where the present invention may operate;

FIG. 2A illustrates a conventional hierarchical XML document tree;

FIG. 2B illustrates a portion of the corresponding pseudo-code necessary to construct the hierarchical XML tree of FIG. 2A;

FIG. 3 is a block diagram showing the architecture of an illustrative XML transmitter in accordance with the present invention;

FIG. 4 is a block diagram showing the architecture of an illustrative XML receiver in accordance with the present invention; and

FIG. 5 is a flow chart describing an exemplary streamed XML process executed by the XML receiver of FIG. 4.

Detailed Description

FIG. 1 illustrates a network environment 100 where the present invention may operate. As shown in FIG. 1, an XML

transmitter 300 transmits streamed XML content to an XML receiver 400. According to a feature of the present invention, discussed further below, the XML transmitter 300 encodes and transmits the XML content in such a manner that allows the XML receiver 400 to decode the portions of the transmitted XML content that are actually received. For example, the XML receiver 400 may decode only a portion of the streamed XML content if part of the XML data is subject to a packet loss or if the complete XML document has not yet arrived. Thus, in accordance with the present invention, the XML receiver 400 can intercept an XML stream in mid-transmission and still perform useful tasks based on the received portion of the XML encoded data. In this manner, the receiver can be confident in the integrity of the received portion of the XML encoded content.

According to another feature of the present invention, each XML document is encoded as a collection of sub-trees. Thus, the receiver 400 no longer needs to receive the entire XML tree. FIG. 2A illustrates an XML document tree 200, and FIG. 2B illustrates a portion of the corresponding pseudo-code necessary to construct the XML tree 200 of FIG. 2A. As shown in FIG. 2A, the XML document tree 200 includes a root node 205 and a number of sub-nodes 210, 220, 230, 240 and 245.

As previously indicated, the XML tree 200 is decomposed and encoded as a collection of sub-trees. A sub-tree is said to be mounted on a given node, and contains the given node and all

nodes beneath the given node in the hierarchical tree structure. For example, as shown in FIG. 2A, sub-tree 225 is mounted on node 230 and contains nodes 230, 240 and 245. Each sub-tree, such as the sub-tree 225, in the larger XML document tree 200 can be parsed and validated by the receiver 400 as if it is an independent tree. It is noted that a given sub-tree can include additional sub-trees.

According to another feature of the present invention, each sub-tree in the streamed XML document utilizes a structure node that serves as a sub-tree wrapper function around each independent sub-tree. The structure node indicates the relationship of the sub-tree to other sub-trees. In this manner, the XML receiver 400 can reconstruct the structure of the full tree 200 provided enough of the streamed XML content is received. Thus, the present invention utilizes structure nodes, in addition to the well-known XML content nodes. With reference to FIG. 2A, nodes 210, 220, 240 and 245 are content nodes, while the root node 205 and node 230 are structure nodes. In addition, the present invention modifies the XML provisions regarding Document Type Definitions (DTDs) to allow parts of the DTDs (DTD chunks) to be present with the sub-trees. The DTD chunks are used in accordance with the present invention to verify the validity of the sub-tree. In one variation, the DTD chunks are not included in the sub-trees, but rather, a reference is included to the full DTD.

Generally, document templates are utilized to parse the XML content for streamed transmission. One or more of the sub-nodes in the full XML tree 200 are treated as root nodes to establish the independent sub-trees. For example, the root node for sub-tree 225 in FIG. 2A is the node 230 upon which the sub-tree 225 is mounted. Each sub-tree has a structure node to allow the transmitted XML content to be reconstructed into the larger XML tree 200, if desired. The larger XML tree 200 can be decomposed into a collection of sub-trees in accordance with the requirements of a given user or application. For example, if the XML document tree 200 was decomposed to establish node C and everything below it as an independent sub-tree 225, the structure node for the sub-tree would indicate that content nodes D and E should be collected and attached to node C.

Thus, as used herein, a "structure node" is any node that identifies the content nodes included in a given sub-tree and indicates where the sub-tree is positioned within the larger XML document tree 200. The structure node can identify the content nodes included in a given sub-tree by generally indicating that all previous content nodes since the previous structure node should be collected, or by providing a specified list of content nodes.

FIG. 3 is a block diagram showing the architecture of an illustrative XML transmitter 300 in accordance with the present invention. The XML transmitter 300 may be embodied as a

general purpose computing system, such as the general purpose computing system shown in FIG. 3. As shown in FIG. 3, the XML transmitter 300 preferably includes a processor 310 and related memory, such as a data storage device 320, which may be distributed or local. The processor 310 may be embodied as a single processor, or a number of local or distributed processors operating in parallel. The data storage device 320 and/or a read only memory (ROM) (not shown) are operable to store one or more instructions, which the processor 310 is operable to retrieve, interpret and execute.

The data storage device 320 includes a text source 350 that may be retrieved from memory or generated in real-time. Thus, the text source 350 may be a pre-recorded textual file, such as a database or another document, or a document generated in real-time, for example, by a user entering textual information from a keyboard (not shown) or by a speech recognition system (not shown). The data storage device 320 also includes one or more XML templates 360 that indicates how the textual information should be decomposed in constructing the XML tree 200, and the independent sub-trees. Thus, the XML transmitter 300 will process the text source 350 using the identified XML template 360 to generate the transmitted content in a streamed XML format, in accordance with the present invention. As previously indicated, each transmitted sub-tree, such as the sub-tree 225, will include one or more content nodes and at least one structure node

indicating how the sub-tree is positioned in the complete XML tree 200.

FIG. 4 is a block diagram showing the architecture of an illustrative XML receiver 400 in accordance with the present invention. The XML receiver 400 may be embodied as a general purpose computing system, such as the general purpose computing system shown in FIG. 4, or the XML receiver 400 may be integrated with another device, such as a digital television (DTV). The XML receiver 400 includes certain standard hardware, such as processor 410 and related memory, such as a data storage device 420, as discussed above in conjunction with the XML transmitter 300 (FIG. 3).

The data storage device 420 includes a streamed XML process 500, discussed below in conjunction with FIG. 5. Generally, the streamed XML process 500 processes each node that is actually received from the XML transmitter 300, even if portions of the larger XML document are not received. In accordance with the present invention, the streamed XML process 500 utilizes the structure nodes to collect the content nodes and subsequently rebuild the full XML document tree 200. Thus, the data storage device 420 also includes storage for the received content nodes 450 that are associated with a current XML tree 200 that is being received by the XML receiver 400.

FIG. 5 is a flow chart describing an exemplary streamed XML process 500 executed by the XML receiver 400 of FIG. 4. The

streamed XML process 500 processes each node that is actually received from the XML transmitter 300, even if some of the nodes are not received or are received in a corrupted manner. Any nodes that are received in a corrupted manner are not processed by the XML receiver 400. It is noted that the present invention provides a method and apparatus for processing the nodes that are actually received by the XML receiver 400, even if some nodes are lost. Techniques for recovering the nodes that are not received or are received in a corrupted manner are not within the scope of the present invention.

As shown in FIG. 5, the streamed XML process 500 initially performs a test during step 510 to determine if a received node is a content node or a structure node. If it is determined during step 510 that a received node is a content node, then the content node is processed directly during step 520, for example, by displaying the content or storing the content in a specified location. If, however, it is determined during step 510 that a received node is a structure node, then the structure node is evaluated during step 530 and the identified content nodes are assembled to form the current sub-tree, and to position the sub-tree in the full XML document under construction.

Thereafter, a test is performed during step 540 to determine if additional nodes have been received that are associated with the current sub-tree. If it is determined during

step 540 that there are additional nodes in the current sub-tree to be processed, then program control returns to step 510 and continues processing the next node in the manner described above. If, however, it is determined during step 540 that there are no additional nodes in the current sub-tree to be processed, then a further test is performed during step 550 to determine if an additional sub-tree has been received that is associated with the current XML tree 200.

If it is determined during step 550 that there is additional sub-tree to be processed in the current XML tree 200 being constructed, then program control returns to step 510 and continues processing the next sub-tree in the manner described above. If, however, it is determined during step 550 that there are no additional sub-trees to be processed in the current XML tree 200 being constructed, then the full XML tree 200 can be assembled during step 560. Thereafter, program control terminates during step 570 until additional nodes are received for processing.

It is to be understood that the embodiments and variations shown and described herein are merely illustrative of the principles of this invention and that various modifications may be implemented by those skilled in the art without departing from the scope and spirit of the invention.

Claims

What is claimed is:

- 5 1. A method of encoding XML content, comprising the steps of:

generating content nodes for transmitting content information; and

generating at least one structure node for identifying
10 said content nodes and for indicating where said content nodes are positioned within a larger XML document tree.
2. The method of claim 1, wherein said content nodes and said structure nodes are generated in accordance with a specified
15 document template.
3. The method of claim 1, wherein said structure node includes a list of said content nodes.
- 20 4. The method of claim 1, wherein said XML content is generated in real-time by a user operating a textual input device.
5. The method of claim 1, wherein said XML content is
25 generated in real-time by a speech recognition system.

6. A method of encoding an XML document, said XML document comprised of a plurality of nodes, said method comprising the steps of:

5 decomposing said XML document into a plurality of sub-trees, each of said sub-trees including at least one node; and
independently transmitting each of said sub-trees with information indicating how said sub-tree is positioned within said larger XML document.

10 7. The method of claim 6, wherein said decomposing step is performed in accordance with a specified document template.

8. The method of claim 6, wherein said information
15 indicating how said sub-tree is positioned within said larger XML document is transmitted in a structure node.

9. The method of claim 6, wherein said XML document is generated in real-time by a user operating a textual input
20 device.

10. The method of claim 6, wherein said XML document is generated in real-time by a speech recognition system.

11. A method for transmitting an XML document as a continuous stream, comprising the steps of:

decomposing said XML document into a plurality of sub-trees;

generating content nodes for transmitting content information included in said XML document; and

generating at least one structure node for each of said sub-trees, said structure nodes identifying content nodes included in said corresponding sub-tree and indicating where said sub-tree is positioned within said larger XML document.

12. The method of claim 11, wherein said decomposing step is performed in accordance with a specified document template.

13. The method of claim 11, wherein said structure node includes a list of said content nodes.

14. The method of claim 11, wherein said XML content is generated in real-time by a user operating a textual input device.

15. The method of claim 11, wherein said XML content is generated in real-time by a speech recognition system.

16. A method for receiving a streamed XML document, said XML document including content nodes and structure nodes, said method comprising the steps of:

determining if each received node is a content node or
5 a structure node;

processing said content nodes directly; and

recompiling said XML document from said content nodes using information contained in said structure node.

10 17. The method of claim 16, wherein said processing step further comprises the step of displaying said content.

18. The method of claim 16, wherein said processing step further comprises the step of storing said content.

15 19. The method of claim 16, further comprising the step of continuing to process subsequent nodes even if one of said nodes is not properly received.

20 20. A method of decoding a received XML document, said XML document comprised of a plurality of nodes, said method comprising the steps of:

receiving a plurality of XML sub-trees, each of said sub-trees including at least one node and indicating how said
25 sub-tree is positioned within said larger XML document; and

positioning each of said sub-trees in a larger XML document using said received position indication.

21. The method of claim 20, wherein said processing step further comprises the step of displaying said content.

22. The method of claim 20, wherein said processing step further comprises the step of storing said content.

23. An XML transmitter comprising:
a memory for storing XML content and computer readable code; and

a processor operatively coupled to said memory, said processor configured to:

generate content nodes for transmitting content information; and

generate at least one structure node for identifying said content nodes and for indicating where said content nodes are positioned within a larger XML document tree.

24. An XML transmitter comprising:
a memory for storing XML content and computer readable code; and

a processor operatively coupled to said memory, said processor configured to:

decompose said XML document into a plurality of sub-trees, each of said sub-trees including at least one node; and

independently transmit each of said sub-trees with information indicating how said sub-tree is positioned within said larger XML document.

25. An XML transmitter comprising:

a memory for storing XML content and computer readable code; and

a processor operatively coupled to said memory, said processor configured to:

decompose said XML document into a plurality of sub-trees;

generate content nodes for transmitting content information included in said XML document; and

generate at least one structure node for each of said sub-trees, said structure nodes identifying content nodes included in said corresponding sub-tree and indicating where said sub-tree is positioned within said larger XML document.

26. An XML receiver for receiving a streamed XML document, said XML document including content nodes and structure nodes, comprising:

a memory for storing computer readable code; and

a processor operatively coupled to said memory, said processor configured to:

determine if each received node is a content node or a structure node;

5 process said content nodes directly; and

recompile said XML document from said content nodes using information contained in said structure node.

27. An XML receiver for receiving a streamed XML document, said XML document including content nodes and structure nodes, comprising:

a memory for storing computer readable code; and

a processor operatively coupled to said memory, said processor configured to:

15 receive a plurality of XML sub-trees, each of said sub-trees including at least one node and indicating how said sub-tree is positioned within said larger XML document; and

position each of said sub-trees in a larger XML document using said received position indication.

20

25

ABSTRACT

A method and apparatus are disclosed for streaming XML content in a manner that allows the receiver to decode the XML data that is actually received, even if an entire XML document is not received. Each XML document is decomposed and encoded as a collection of sub-trees. Each sub-tree from the larger XML document tree can be parsed and validated by the XML receiver as if it is an independent tree. Each streamed XML document utilizes a structure node that serves as a sub-tree wrapper function around each independent sub-tree. The structure node indicates the relationship of the sub-tree to other sub-trees, thereby allowing the XML receiver to reconstruct the full tree.

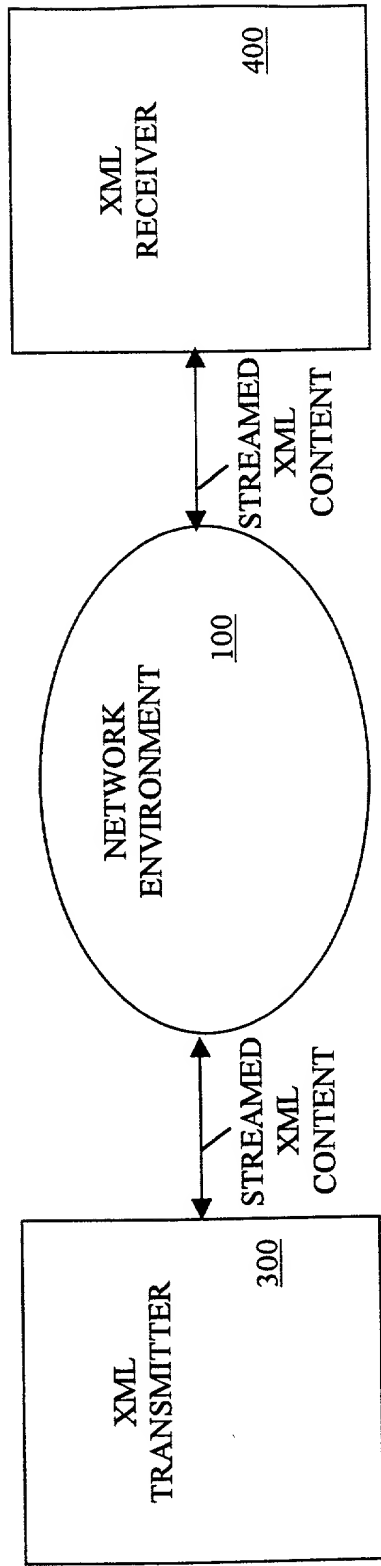


FIG. 1

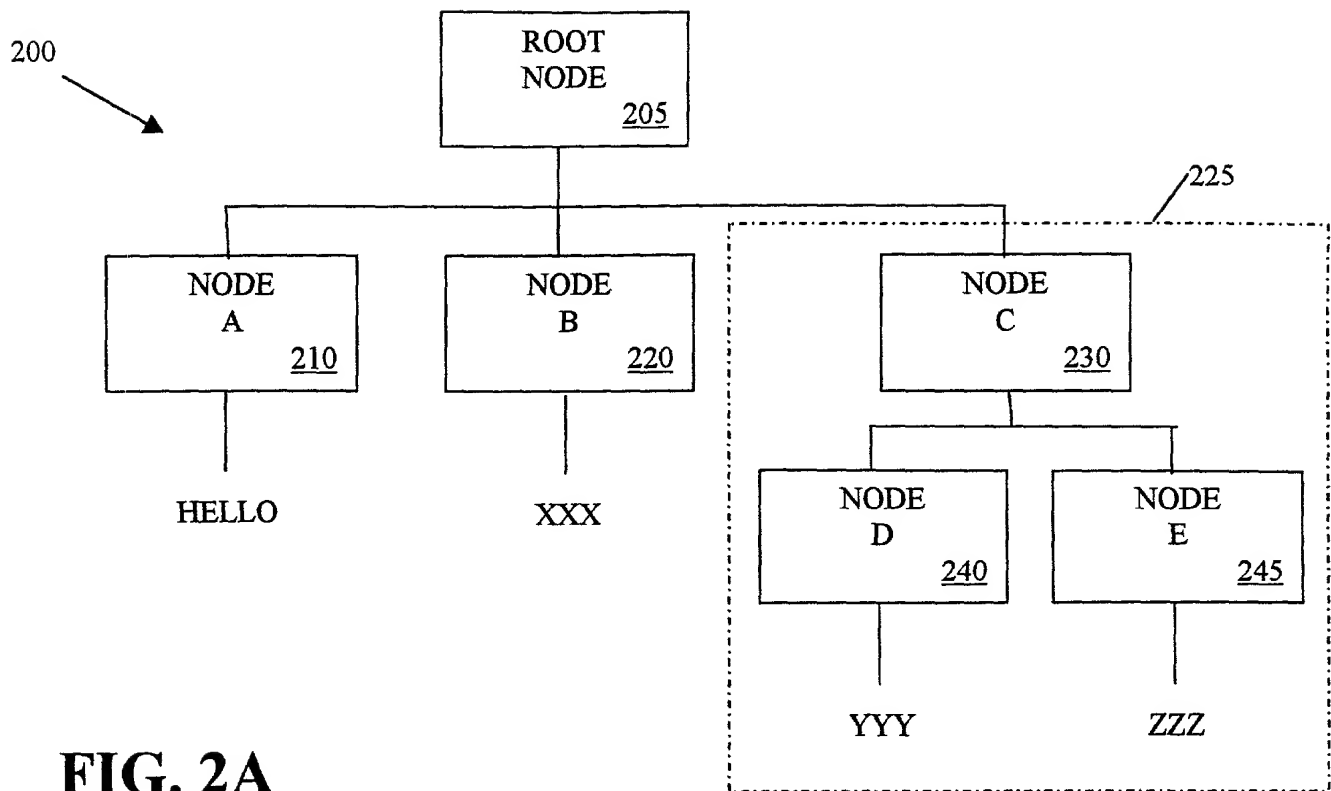


FIG. 2A

250 {
 <ROOT>
 <A> HELLO
 XXX
 <C> <D> YYY </D> <E> ZZZ </E> </C>
 </ROOT>

FIG. 2B

XML
TRANSMITTER

300

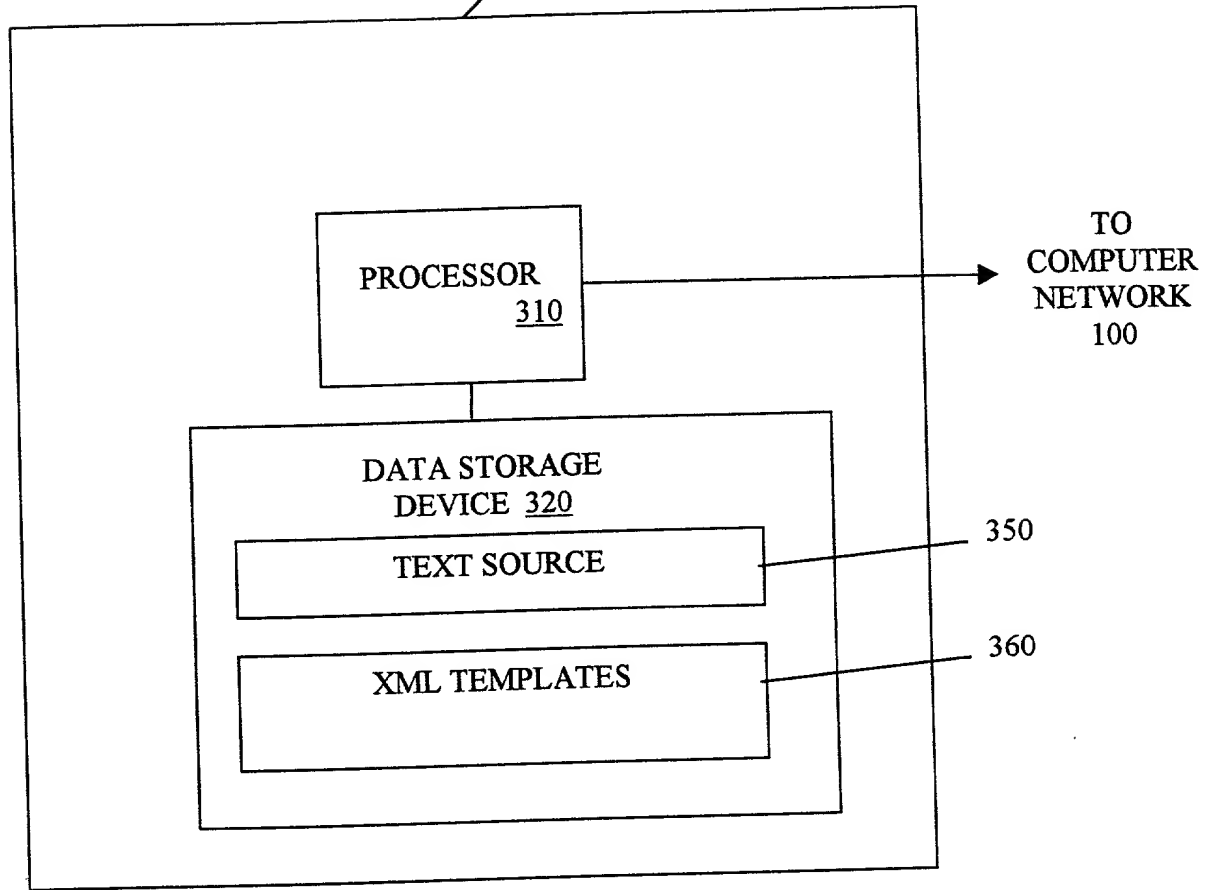


FIG. 3

XML RECEIVER

400

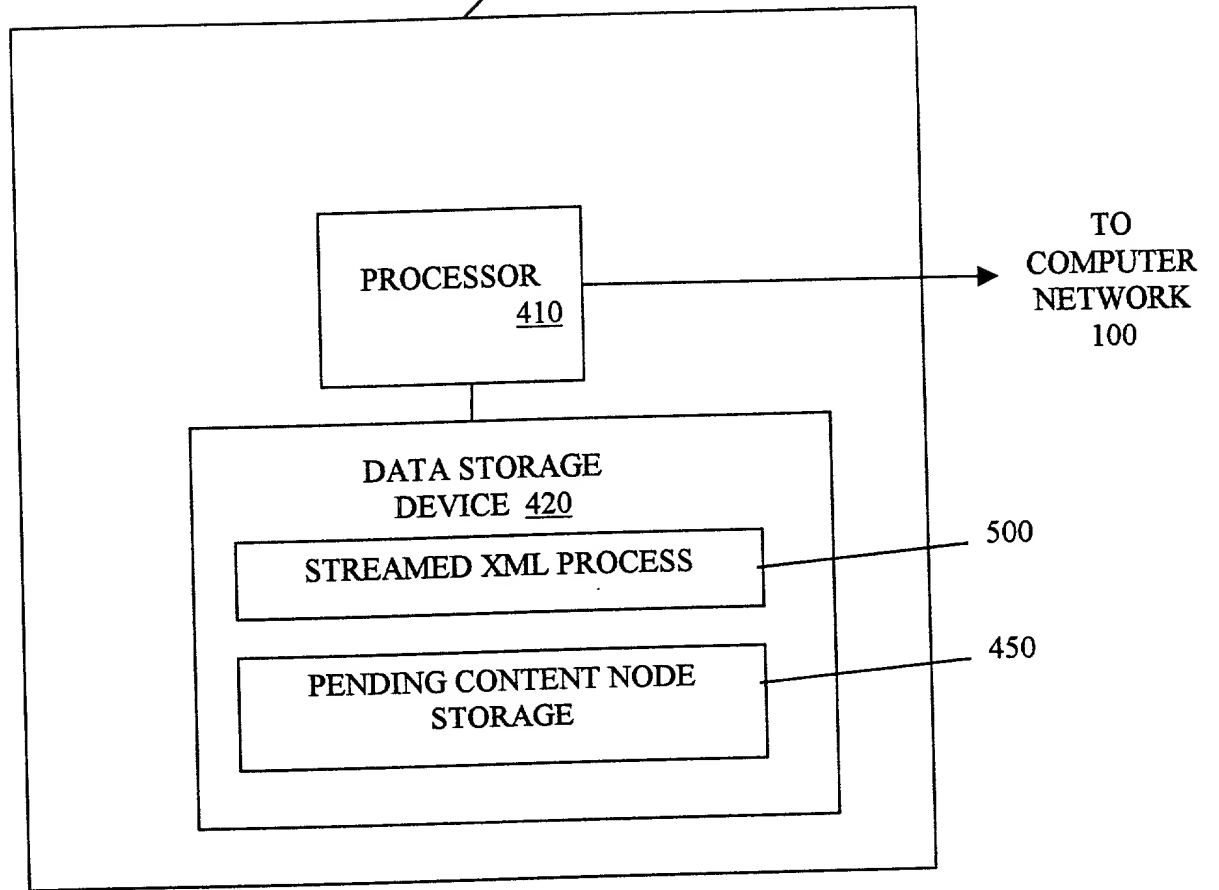
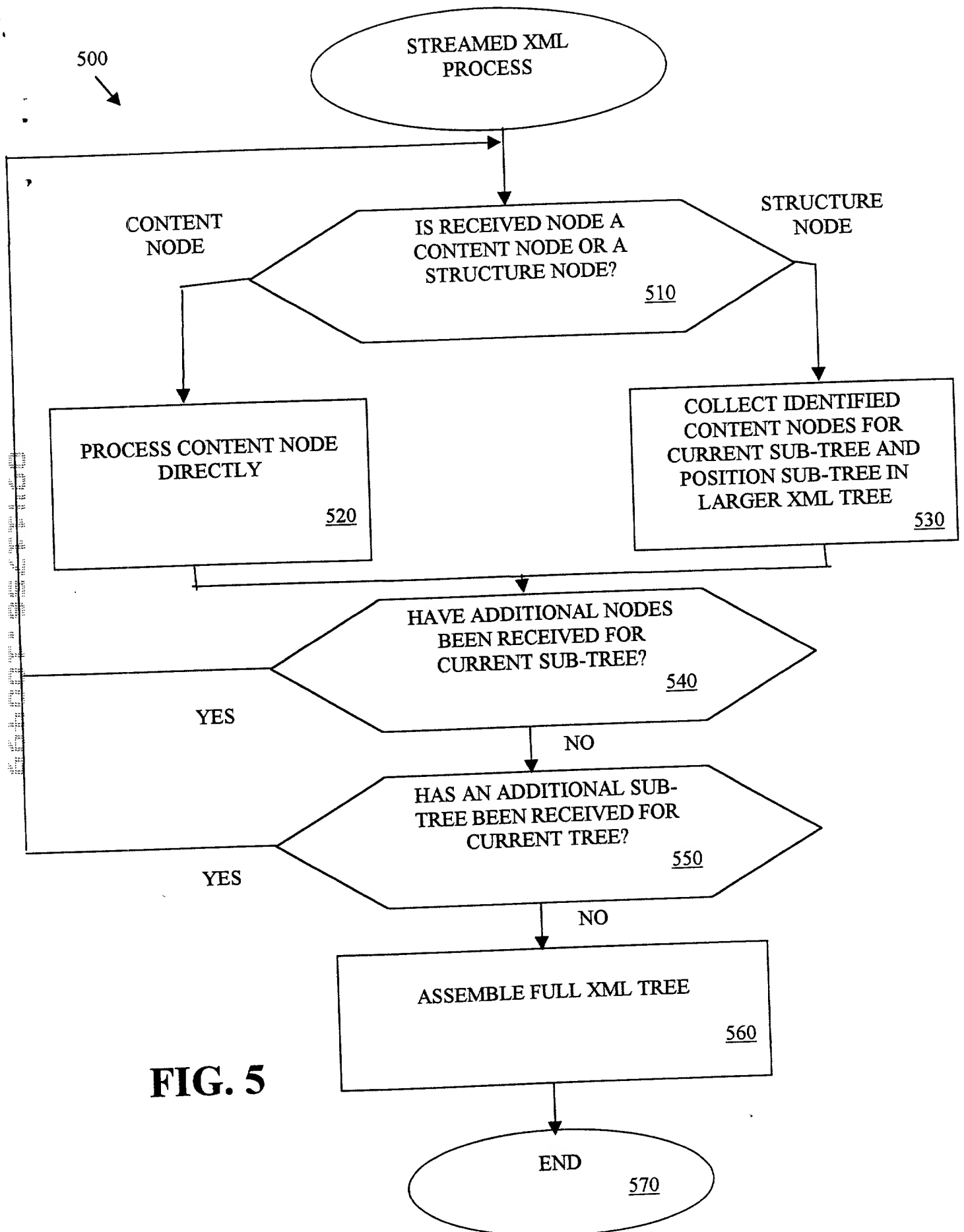


FIG. 4



PHA 23,789

DECLARATION and POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Method and Apparatus for Streaming XML Content the specification of which (check one)

☒ is attached hereto.

_____ was filed on _____ as Application Serial No. _____ and was amended on _____

(if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by the amendment(s) referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulation, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)

COUNTRY	APPLICATION NUMBER	DATE OF FILING (DAY, MONTH, YEAR)	PRIORITY CLAIMED UNDER 35 U.S.C. 119

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application (s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35 United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

PRIOR UNITED STATES APPLICATION(S)

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (PATENTED, PENDING, ABANDONED)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Algy Tamoshunas, Reg. No. 27,677

Jack E. Haken, Reg. No. 26,902

SEND CORRESPONDENCE TO: Corporate Patent Counsel; U.S. Philips Corporation; 580 White Plains Road; Tarrytown, NY 10591	DIRECT TELEPHONE CALLS TO: Gregory L. Thorne (914) 333-9665
--	--

PHA 23,789

Dated: Oct. 4, 1999		Inventor's Signature: Raymond J. Krasinski		
Full Name of Inventor	Last Name: Krasinski	First Name : Raymond	Middle Name: J.	
Residence & Citizenship	City Suffern	State or Foreign Country New York	Country of Citizenship United States of America	
Post Office Address	Street 5 Reigate place	City Suffern	State or Country New York	Zip Code 10901

Dated:		Inventor's Signature:		
Full Name of Inventor	Last Name:	First Name :	Middle Name:	
Residence & Citizenship	City	State or Foreign Country	Country of Citizenship	
Post Office Address	Street	City	State or Country	Zip Code

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

RAYMOND J. KRASINSKI

PHA 23,789

Serial No.

Filed: CONCURRENTLY

Title: METHOD AND APPARATUS FOR STREAMING XML CONTENT

Commissioner of Patents and Trademarks
Washington, D.C. 20231

APPOINTMENT OF ASSOCIATES

Sir:

The undersigned Attorney of Record hereby revokes all prior appointments (if any) of Associate Attorney(s) or Agent(s) in the above-captioned case and appoints:

GREGORY L. THORNE

(Registration No. 39,398)

c/o U.S. PHILIPS CORPORATION, Intellectual Property Department, 580 White Plains Road, Tarrytown, New York 10591, his Associate Attorney(s)/Agent(s) with all the usual powers to prosecute the above-identified application and any division or continuation thereof, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

ALL CORRESPONDENCE CONCERNING THIS APPLICATION AND THE LETTERS PATENT WHEN GRANTED SHOULD BE ADDRESSED TO THE UNDERSIGNED ATTORNEY OF RECORD.

Respectfully,


Jack E. Haken, Reg. 26,902
Attorney of Record

Dated at Tarrytown, New York
this 29th day of September, 1999.